

TRUST IN
AUSTRALIAN
Wool

THE
Australian
Wool Industry



HEALTH



WELFARE



BIOSECURITY



SUSTAINABILITY



TRACEABILITY



Foreword

Australian wool is trusted by those who use it and wear it right around the globe. This handbook is designed to help strengthen that trust among the consumers who drive demand for it.

Within, you will find essential facts regarding sheep health, welfare and biosecurity practices, as well as the world-leading sustainability and traceability processes that underpin the Australian wool industry.

Fostering trust, for the sake of the industry

Australia produces the best wool in the world. It is the wool of choice for use in fine apparel and luxury garments; sought after by all processing nations due to its renowned quality.

Australian woolgrowers produce all microns (fineness) of wool, which means our wool is also chosen for interior products, and after more recent innovations, products such as surfboards, athleticwear and specialist uniforms.

Underpinning Australian wool's popularity are the world-leading practices our woolgrowers use on-farm, every day. These practices are backed by comprehensive state and national frameworks for sheep health and welfare (including regulation), and world-leading health and welfare programs. Our growers and our government have made substantial, long-term investments in innovation and industry development across areas such as genetics, animal husbandry, traceability and provenance.

As an industry, we have developed the highest clip preparation and product specification standards available for wool. We also continually focus on the development and growth of international export and consumer markets.

As consumer demands influence on-farm and supply chain practices more and more, and the world's focus is increasingly on solving environmental and sustainability issues, it is more important than ever that we continue to foster trust in Australian wool with the end users of our eco-friendly product.

Communicating these practices and systems to consumers is important for the reputation and ongoing success of Australian wool in international markets. This handbook has been designed to further create Trust in Australian Wool.

Jo Hall

Chief Executive Officer
WoolProducers Australia

Sharing knowledge, for everyone's benefit

The first of its kind, Trust in Australian Wool has been designed as a reference to Australian wool production, and the industry and government systems and regulations that underpin industry integrity. Anyone interested to learn about the Australian wool industry, from students to career professionals, will find this handbook a simple yet comprehensive summary of the industry, its key features and achievements, as well as its framework for ensuring the excellence of its products.

This handbook encompasses information on:

- the Australian wool industry's production systems and quality assurance schemes across the areas of animal health, welfare, biosecurity, traceability, and sustainability;
- Australian wool's credentials as a natural, sustainable product that is grown and marketed with excellence to domestic and international wool consumers.

We hope you find this handbook useful in building your knowledge about the Australian wool industry.

Kathleen Plowman

Chief Executive Officer
Animal Health Australia

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AND MARKETING



SUSTAINABILITY



SUPPORTING
SUSTAINABLE GLOBAL
DEVELOPMENT



KEY ORGANISATIONS
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Australian wool in a global context

Australia is the leading global supplier of wool and the world's largest wool export nation.

Australia's wool production reflects our unique geography and climate, and our culture of innovation and excellence. This culture has resulted in world-leading systems for clip preparation and specification, biosecurity, traceability, and for promoting practices on-farm that benefit the lifetime health and welfare of sheep.



IMAGE BY KELLY TUNNEY FOR HERCAMPBERRA

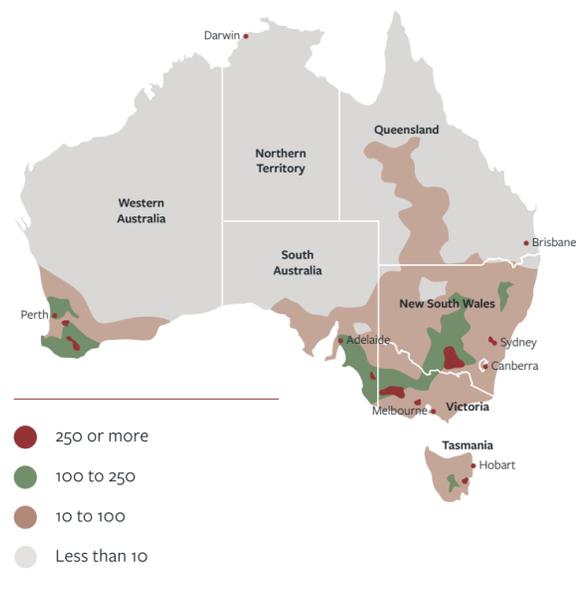
Australia's production

Since the first sheep arrived in Australia in 1788, wool production has extended through six states, from high rainfall pasture land to semi-arid regions. Just over half of that production occurs in New South Wales and Victoria. However, production can vary greatly from year to year, with the greatest influence being seasonal rainfall. For example, large parts of eastern Australia recently experienced a severe drought which saw Australia's total wool production drop by 16% in two years.

Total shorn wool production by state - 2019/20

State	mkg greasy
New South Wales (NSW)	92.1
Victoria (VIC)	67.3
Western Australia (WA)	55.0
South Australia (SA)	49.5
Tasmania (TAS)	9.0
Queensland (QLD)	6.7
National	280

Sheep numbers per square kilometre



Innovation and marketing

Australia invests more than any other country in wool research and development (R&D). This shows the long-standing commitment to supporting sustainable industry growth and development held by both Australian wool growers and the Australian government.

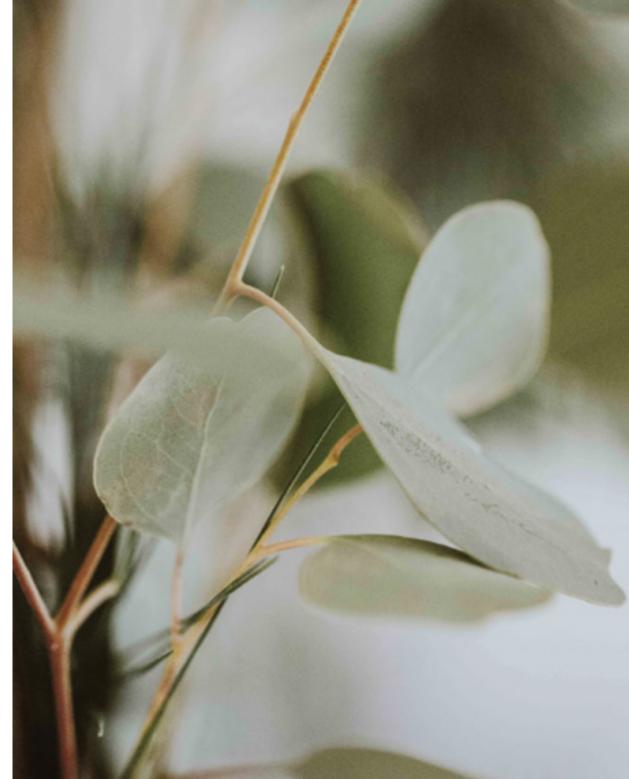
Since 1936, Australian wool growers have agreed to contribute a levy on wool sales to support continuous improvement of industry practices and international competitiveness. The wool levy rate is set by growers, and the Australian Government co-invests matching amount toward R&D. Australian Wool Innovation Limited (AWI) is responsible for investing these funds into wool marketing and R&D activities along the worldwide supply chain of Australian wool.

AWI's subsidiary for marketing activities, The Woolmark Company, has offices in 16 countries around the world and owns one of the world's most recognised logos – the Woolmark – which has appeared on more than five billion products since its introduction.

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Key Australian wool innovations

- Selling systems** – Since the early 1970s, Australia has revolutionised how wool is sampled and sold around the world. This includes wool presale sampling and auction sale systems, which ensure well-informed and efficient trading in three major selling centres.
- Specifications** – Australia drove the development of most widely used wool measurement systems, including those for fibre diameter, staple length and staple strength. These are critical specifications for wool processors, as they determine wool processing potential.
- Harvesting methods** – Australian innovations have influenced the nature of modern wool harvesting tools, including the handpieces used by shearers and bale presses. This is still an active area of R&D investment, which includes robotics and other de-fleecing methods.
- National Wool Declaration** – Since 2008, the Australian National Wool Declaration has allowed wool growers to declare their mulesing status which is now internationally recognised and widely used.
- Husbandry practices** – AWI's investment in the Lifetime Wool Production Project led to the widely adopted Lifetime Ewe Management (LTEM) education program, which lifts lamb survival and boosts ewe health and productivity.



A grower's story

Michael and Millie Taylor, of 'The Hill' in Kentucky NSW, are part of a family-run sheep farming operation dating back to 1839. The 750-hectare property – adjoined by properties run by extended family members – is an example of a family-owned sheep farm that also exemplifies innovation and stewardship of natural resources.

'The Hill' is home to 1,600 non-mulesed ultrafine Merino breeding ewes and their progeny, cattle, and a significant silviculture enterprise.

More than 200,000 trees have been planted by the Taylors on 'The Hill' since 1979, and the farm is recognised for its biodiversity.

“By improving tree cover and biodiversity, our farm has become more resilient, productive and healthy as a result, with recent research concluding we're also achieving carbon negative status.”

– Michael Taylor

Fast Facts

Australia is the largest exporter of greasy wool, producing 39% of world exports.



The total value of the wool clip to the Australian economy in 2018-19 was AU\$3.4 billion.



The Australian flock consists of 67 million sheep, including 31 million Merino-breeding ewes and a similar number of lambs.



280 million kilograms of greasy wool were produced in the last complete season. This wool was offered to the global wool trade in 325,000 separate lots of wool, where each of these sale lots was independently measured according to international wool testing standards, and inspected to ensure adherence to Australia's Code of Practice for Clip Preparation.

200,000 people are employed within the Australian wool industry across production, farm services, research, and marketing.



The Australian clip average fibre diameter is 20.5 micrometres, and staple length 83 millimetres.



For 85 years, Australian wool growers and taxpayers have partnered to continuously invest in wool research, development and marketing.



Australian Wool Trade



Australian wool is the cornerstone of the global wool textile trade, reflecting our status as the largest exporter of wool in the world and our supply of 90% of the world's apparel wool.

Australian wool is converted into a wide range of apparel and interior textile products, from the finest suits, sportswear and babywear, through to socks, shoes, and luxurious home textiles.

These products are primarily consumed in Europe, Asia and North America, but are a part of daily life for consumers all across the globe.



Australian wool is converted into a wide range of apparel and interior textile products, from the finest suits, sportswear and babywear, through to socks, shoes, and luxurious home textiles.



Fast Facts

Australian wool is exported to more than 20 countries around the world.



92% of Australia's wool exports are in greasy form, with the remainder exported in scoured or carbonised forms.



Four countries (China, India, Italy and South Korea) account for 90% of all Australian wool exports.



China is the most important trade partner for the Australian wool industry, accounting for 76% of Australia's wool exports, and more than 90% of Australia's sheepskin exports.



Due to established Free Trade Agreements, Australian raw wool and many forms of wool products can be exported tariff-free to China, Hong Kong, Japan, Korea, Thailand and the US, among others.



Around US\$80 billion per annum is spent on wool apparel at retail, with expenditure dominated by the US, Japan, China, Germany, UK and Italy.



Given the dominance of fine Merino production in Australia, typically, Australian wool is retailed as high-end fashion and lightweight knitwear

Key wool trade partners

Country	Export volume 2018/19-19/20 (Greasy kg eq.)	Share
China, P.R.	196,256,988	75.8%
India	14,290,607	5.5%
Italy	12,432,500	4.8%
Republic of Korea	9,951,942	3.8%
Czech Republic	8,677,567	3.4%
Thailand	3,019,622	1.2%
Egypt	2,425,318	0.9%
Japan	1,730,835	0.7%
Germany	1,519,195	0.6%
Taiwan	1,514,382	0.6%
Malaysia	1,225,632	0.5%
United Kingdom	1,198,222	0.5%
Bulgaria	1,108,204	0.4%
United Arab Emirates	732,583	0.3%
Turkey	617,588	0.2%
USA	614,750	0.2%
Mexico	328,598	0.1%
Mauritius	345,028	0.1%
Uruguay	199,242	0.1%
New Zealand	217,412	0.1%
Others	516,757	0.2%
Total	258,922,967	100.0%

Wool export categories

Australia primarily exports raw wool, given the domestic processing industry is relatively small.

Averaged across the 2018/19 and 2019/20 seasons, Australia exported the equivalent of 259 million kilograms of raw wool.

92% of the volume exported was raw wool, with 6% in carbonised form, 1.7% in scoured form, and 0.03% in top form.

In addition to wool exports, Australia exported 136 million kilograms of sheepskins in 2019/20.

Consuming Australian wool

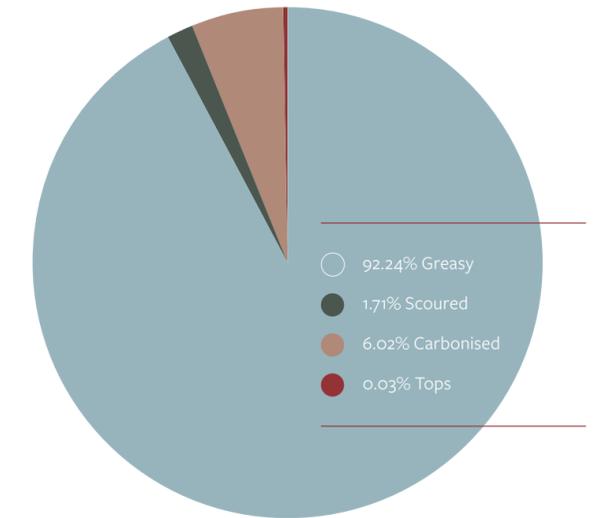
Consumers spend approximately US\$80 billion per year on wool apparel, with expenditure predominantly in markets of the US, Japan, China, Germany, UK and Italy. These markets account for around 70% of the global consumer spend on wool garments.

Given the dominance of fine Merino production in Australia, typically, Australian wool is retailed as:

- High-end fashion, including lightweight men's and women's woven suits, jackets and trousers.
- Lightweight knitwear, for next-to-skin uses such as t-shirts, underwear, ski-wear and more recently casual footwear.

The remaining 10-15% of production is typically converted into carpets and other interior textiles.

Australian Wool Exports by Category



Free Trade Agreements

Australia has comprehensive trade agreements with many countries around the world, including Free Trade Agreements (FTAs).

As a result, Australian raw wool and many forms of wool products are able to be exported tariff-free to China, Hong Kong, Japan, Korea, Thailand and the US, among others.

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For more information:

The Australian Commonwealth Department of Foreign Affairs and Trade (DFAT) has a web-accessible Free Trade Agreement Portal.

The Australian Government Trade and Investment Commission (Austrade) also provides information about FTAs and offers FTA seminars through the Austrade website.

Growing demand through innovation

Australia is investing in new consumer product innovations, including:

- Merino knit athleisure footwear – such as the Athletic Propulsion Labs running shoes, which feature an 80% Australian Merino wool upper.
- Use of Superfine Merino base layer knitwear as a valuable adjunct therapy for sufferers of atopic dermatitis, across a wide age range from infants to adults.
- Superfine Merino sleepwear, which has been shown in a clinical trial to improve sleep quality, by helping to regulate body temperature.
- Fine Merino knits as fire-resistant base layer undergarments for military, fire service and police first responders.

Sheep health

Maintaining sheep health is vital, because well-cared-for sheep are the most productive and profitable.

Animal health is a recognised national and state government priority, and a national framework of standards and guidelines for sheep health has been established.

There is a big investment of time and effort directed to preventative health care for sheep, including the development of new technologies and training for growers, and an extensive network for monitoring sheep diseases and health conditions.



IMAGE BY LEAN TIMMS

Sheep are the lifeblood of the wool industry

Ensuring sheep health is crucial to industry viability, wherever sheep are raised.

Sheep and wool are grown under vastly different climatic regions across Australia; as a result, sheep are naturally subject to variable health and welfare challenges.

Australian sheep diseases and parasites have been estimated to cost more than AU\$2 billion each year in lost production and control costs.

Reflecting the magnitude of this challenge, decades-worth of industry investment and collaboration between state and national research and extension efforts have helped support sheep health.

A critical initiative Australia has put in place to build integrity into sheep and wool production is a well-developed system for declaring sheep health status, backed by a national monitoring and data collection program.

Australian growers are also able to access a comprehensive suite of sheep health improvement tools, developed from decades of experience raising sheep in diverse environments. There has also been an emphasis on disseminating beneficial know-how, and a commitment to understanding what is best practice within different production systems.

National framework underpinning sheep health

Just as Australia's wool industry has a comprehensive national framework for investment in R&D and marketing to help foster success of the industry, it also has a national framework aimed at good sheep health outcomes and a strong emphasis on collaboration and co-investment across state borders and other livestock industries.

- Biosecurity is a shared responsibility, with all participants having a role in delivering effective biosecurity outcomes. The Australian Government is responsible for international animal health and biosecurity matters that are intended to keep Australia free of exotic pathogens, pests and diseases, as well as disease reporting, export certification and trade negotiation. It also coordinates and provides advice on national policy for animal health and welfare.
- Under the Australian Constitution, state and territory governments have legislative responsibility and enforcement powers for animal health services within their borders. These governments invest in veterinary officers and animal health inspectors so that Australia has a national, regional and local disease surveillance capability.
- Australian governments – both state and national – have a close association with livestock industries, through each of the peak councils and rural R&D corporations. This allows consultation between government and industry to determine national animal health priorities, participate in policy development, support targeted animal health activities and contribute to emergency responses.

Sheep Health Declarations

The National Sheep Health Declaration (SHD) is Australia's system for declaring the health of sheep when sold.

SHDs are an important tool for buyers assessing the health status and management history of sheep.

The SHD facilitates animal health and biosecurity risk transparency as sheep are bought and sold, which aims to reduce the transfer of risk from one producer to the next.

Managing ewe health

A partnership between growers and industry, the Lifetime Ewe Management (LTEM) program is a highly successful industry adoption program which delivers improved grower skills in the management of the pregnant and lambing ewe.

The LTEM program grew from an R&D investment of AU\$6.7 million by AWI, and has now benefitted more than 20% of the national sheep flock.

In terms of impact, LTEM graduates have historically improved the lamb weaning rate by 8-9%, and decreased ewe mortality by a third.

Smart growers, healthy sheep

- ParaBoss provides Australian sheep producers and their advisers with current, practical, proven and independent information to manage worms, flystrike and lice in sheep, as well as worms in goats.
- SheepGenetics is the national Australian sheep genetic database, which provides Australian Sheep Breeding Values (ASBV) for production, health and resilience traits across the prime lamb, Merino, and goat industries. Health-related traits include worm egg count, fat depth, breech cover and wrinkle score ASBVs.

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Sheep and wool are grown under vastly different climatic regions across Australia; as a result, sheep are naturally subject to variable health and welfare challenges.

Fast Facts

Animal Health Australia (AHA) is the not-for-profit organisation responsible for facilitating partnerships between governments, major livestock industries and other stakeholders to protect animal health and the sustainability of Australia's livestock industries.



AHA manages Australia's National Sheep Health Monitoring Project (NSHMP), which commenced in 2007 to monitor adverse health conditions of sheep in abattoirs. In the NSHMP, qualified inspectors monitor sheep health at 10 domestic and export abattoirs located across Australia. Data from the monitoring is then entered into a national database (the Endemic Disease Information System).

In 2019, approximately nine million sheep were inspected in the project.



Unlike many other countries, Australia is free from Transmissible Spongiform Encephalopathies (TSE) – a devastating group of diseases in which the most widely known sheep variant is scrapie. AHA manages Australia's TSE Freedom Assurance Program.



The Integrity Systems Company (ISC) is a wholly owned subsidiary of Meat and Livestock Australia and has a role for managing the national integrity programs (National Livestock Identification System, Livestock Production Assurance, and Sheep Health Declarations).



Building on information provided through the NSHMP, the Livestock Data Link (LDL) is an initiative of ISC, which improves feedback on animal health information and carcass compliance. The LDL feedback provided to growers enables them to address issues identified at the abattoir.

Insect-borne viruses, such as Bluetongue, represent a serious risk to Australia's sheep, cattle and goat industries, and occur in our region. To monitor Australia's arbovirus status, AHA manages the National Arbovirus Monitoring Program.

Sheep welfare

Sheep health and wellbeing is fundamental to the success and sustainability of every farm, and producers are held accountable for their animals' welfare.

Australia has a proud record of achievement in sheep welfare innovation and adoption of new technologies and has laws and regulations that create a framework for the industry to uphold as a benchmark of animal welfare.

The industry and our governments are committed to continuously improving animal welfare techniques and refining standards.



IMAGE BY CAM DAVIS AT RAMPRO

For the past three decades, the welfare of livestock in Australia has been supported by national codes of practice for livestock welfare.



Commitment to animal welfare

While producers are held accountable for their animals' welfare, there are also national and state frameworks of welfare that are informed by industry-agreed Australian Animal Welfare Standards and Guidelines. These underpin access to domestic and overseas markets and reinforce Australia's commitment to advancing meaningful and effective animal welfare outcomes.

Supporting this, Australia's sheep, cattle and goat industries have implemented a national Livestock Production Assurance program in which the Australian Animal Welfare Standards and Guidelines are a central element.

The Australian wool industry demonstrates its ongoing commitment to the positive welfare states of animals through their policy and advocacy efforts led by WoolProducers Australia, the national wool industry representative body.

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A national framework for sheep welfare

In Australia, state and territory governments in partnership with the Royal Society for the Protection of Animals (RSPCA) ensure supply chain accountability for livestock welfare.

Each state and territory has legislation that mandates and enforces animal welfare standards, as well as the prevention of cruelty to animals and personal accountability for animal welfare, including sheep producers.

For the past three decades, the welfare of livestock in Australia has been supported by national codes of practice for livestock welfare. These have been recently replaced by the Australian Animal Welfare Standards and Guidelines so that welfare can continually be improved and compliance through the supply chain can be enforced.



Meet a researcher

Dr Alison Small is a Principal Research Scientist at CSIRO McMaster Laboratory near Armidale in Northern NSW – the heart of a Major Superfine wool production area.

Dr Small is a leading welfare researcher across a number of areas including improving lamb survival, provision of pain relief for sheep and cattle, and humane slaughter.

With a background in veterinary practice in Scotland, and a doctorate from the University of Bristol, Dr Small and colleagues have recently completed research into analgesic options for surgical mulesing and its alternatives.

Standards and guidelines

The Australian Animal Welfare Standards and Guidelines for Sheep specify the legal standards of management and husbandry required to protect and maintain the welfare of sheep in Australia.

These standards and guidelines, which apply to all those responsible for the care and management of sheep, cover various welfare requirements in relation to: feed and water; risk management in extreme weather, natural disasters, disease, injury and predation; facilities and equipment; handling, management and husbandry; breeding management; and humane killing.

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Industry assurance

The Livestock Production Assurance (LPA) program is the ISC's on-farm assurance program covering food safety, animal welfare and biosecurity. LPA accreditation is a requirement for market access to more than 100 countries around the world for red meat.

Under LPA, on-farm practices must be implemented to ensure the management and handling of livestock is consistent with the requirements of the Australian Animal Welfare Standards and Guidelines for cattle, sheep and goats.

LPA-accredited producers are audited and are required to keep a current copy of the Australian Animal Welfare Standards and Guidelines for cattle, sheep or goats (as applicable) as a reference.

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Breec fly strike and mulesing

The practice of mulesing was invented more than 90 years ago to provide Merino sheep with lifetime protection against breec flystrike. Flystrike is caused by fly larvae (maggots) being laid on the breec area of sheep and infesting and feeding on tissues. Left untreated, breec flystrike typically results in a slow, painful death to the animal.

Mulesing has proven remarkably effective as a preventative measure, because it involves one-time surgical removal of wool-bearing skin on either side of the breec of lambs, greatly reducing flystrike of the breec. Australian woolgrowers have invested heavily in development of alternative procedures to mulesing, with a number of alternatives being trialled.

Innovation in pain relief

Australia has made major contributions to the development of pain relief for livestock, including:

- **Tri-Solfen®** – the first topical anaesthetic and antiseptic product of its kind to be developed for post-procedure pain relief to surgical wounds in lambs and calves. Tri-Solfen® has become widely adopted across the Australian sheep industry, and the technology is now being developed for application to prevent pain and minimise suffering associated with wounds in humans.
- **Buccalgesic OTM®** – an innovative analgesic and anti-inflammatory product, delivered as a gel into the mouths of treated sheep and cattle and rapidly absorbed into the bloodstream. Developed with support from MLA and Commonwealth funding, Buccalgesic OTM® is now being commercially adopted by growers around Australia.
- **Numnuts®** – a practical and user-friendly method for alleviating the pain suffered when lambs go through elastrator ring-based castration and tail-docking procedures, developed in collaboration with AWI, CSIRO and MLA.

Now that these products are widely available, pain relief application when mulesing is moving towards becoming mandatory. WoolProducers Australia policy calls for state and territory governments to mandate pain relief when mulesing throughout Australia – something that has already been adopted into legislation in Victoria.

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Wool biosecurity

As an island nation, Australia is free from some of the world's most severe pests and diseases.

In part, this is because biosecurity is an Australian government and industry priority.

Australia has clearly defined emergency disease response plans and strong governance arrangements that ensure preparedness in the event of a biosecurity incursion.

To be 'world-leading' implies constant improvement, and the Australian wool industry is actively investing to maintain the highest possible standards.



IMAGE BY LEAN TIMMS

Investing in a future that's clean and green

Biosecurity measures have played a critical role in reducing risk and contributing to Australia's global reputation as a clean, green and safe source of food and fibre.

While our geographical isolation has contributed to this, our 60,000-kilometres of coastline and a rapid increase in international trade and travel mean the challenges for valuable export industries such as wool are growing.

Protecting Australian sheep from the introduction and spread of diseases, pests and weeds, as well as reducing the incidence of existing diseases, pests and weeds, is the responsibility of all of us e.g. sheep growers, managers and handlers along with governments, scientists, veterinarians and the wider community.

The Australian wool industry takes these concerns seriously and is collaborating with the Commonwealth and state governments with investments that aim to maintain our status and maximise preparedness.

Examples of these include Australia's National Livestock Identification System, the Australian National Sheep Industry Biosecurity Strategy and Emergency Animal Disease preparedness activities.

A national framework for sheep biosecurity

Australia's freedom from the world's most severe agricultural pests and diseases reflects a long-term commitment to the highest biosecurity standards across our farming industries and supply chains. Two major components are strong on-farm biosecurity tools and surveillance systems, and the strong pre-and post-border controls and traceability systems which underpin international trade continuity.

Ensuring trade continuity

For Australia, and our many international trade partners, our robust systems ensure strong border controls, high biosecurity standards and trade continuity are maintained.

Australia's wool industry actively invests in wool trade continuity research, through a collaborative industry, state and national government investment strategy.

As a result of this strategy, Australia's trade partners benefit from effective government and industry action, minimised disruption to wool trade flows of Australian wool to the world's markets, and the most rapid possible return to normal business for wool growers, customers and other participants in the wool industry pipeline.

Trade continuity innovation

Three examples of Australian wool trade continuity innovations are:

1. **Traceability** – Large scale trials of electronic bale tags are underway in Australia, through the Australian Wool Exchange. These tags will assist with traceability and information management.

2. **Decontamination** – Australia is developing a high throughput process for treating wool bales with decontaminant fluid, through the Australian Wool Testing Authority. When finalised, this system will help the wool trade safely treat the exterior of bales and enable safe handling and storage of bales from disease-affected areas.
3. **Disinfection** – In partnership with other countries, Australia is examining systems for bale disinfection (treating infectious material within bales of wool), potentially including bale storage at elevated temperatures that are proven to inactivate the foot and mouth disease virus.

Farm biosecurity

Australia has a well-established national Farm Biosecurity Program – a collaboration of the animal and plant production sectors that provides farmers access to the practical tools needed to reduce biosecurity risks and raise awareness.

Details of this award-winning program are accessible on the farm biosecurity website, where farmers can download the FarmBiosecurity app, access practical training videos as well as farm planning tools and manuals, and access information to ensure vendor declarations are completed correctly.

The Australian National Livestock Identification System (NLIS) captures livestock movements nationally and is used for locating animals by tracing their movements in the event of an emergency animal disease outbreak or a food safety issue. NLIS is managed by the ISC, a subsidiary of MLA.

The system uses unique property identification codes as well as animal identifiers, and can be used to trace animals from their property of birth through to processing. It provides a competitive advantage in global markets for cattle, sheep and goats.

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Crisis management

The Emergency Animal Disease Response Agreement (EADRA), managed by AHA, is a unique contractual arrangement that brings Australia's governments and industry groups together to collectively reduce risk and significantly increase Australia's capacity to prepare for and respond to emergency animal disease incursions.

For emergency livestock diseases, the Australian Veterinary Emergency Plan (AUSVETPLAN) is the nationally agreed approach for the response to emergency animal disease incidents in Australia, and is maintained by AHA.

The Australian Emergency Plant Pest Response Plan (PLANTPLAN) is the equivalent for emergency plant disease responses, and is maintained by Plant Health Australia.

Our ability to respond effectively and link cross-sectoral priorities is constantly being improved – a recent example is the National Sheep Industry Biosecurity Strategy, a collaboration across sheep meat and wool sectors.

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International cooperation

The OIE (The World Organisation for Animal Health) is the World Trade Organisation-recognised intergovernmental organisation responsible for improving animal health worldwide. Australia has a strong history of international collaboration on animal health issues. It is an active contributor to OIE, and the current OIE President is Australia's Chief Veterinary Officer.

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Meet a wool grower

Steve Harrison is a wool grower from Gippsland in Victoria, who operates Bindawarra Merino Stud, runs a successful commercial sheep flock of 4,000 ewes, and is a director of WoolProducers Australia. In 2016, Steve attended the real-time Foot and Mouth Disease Outbreak training program in Nepal, to gain first-hand experience with the disease and its management.

“The training was eye-opening for me. It underlined how important it is for Australia to maintain its disease-free status – something which takes more than just luck.”

– Steve Harrison

Wool traceability

Ensuring traceability of farm products along the supply chain is increasingly important for all agricultural industries.

The Australian wool industry has a comprehensive system for tracing wool back to where it was grown and harvested.

While this meets our needs and the needs of our trading partners, efforts to enhance and future-proof our systems are underway.



IMAGE BY LEAN TIMMS

Fast Facts

Typically, a single wool bale holds fleece wool from 30-40 sheep.



Between 1.5 and 2 million bales of wool are produced in Australia each year, across more than 37,000 sheep production enterprises.



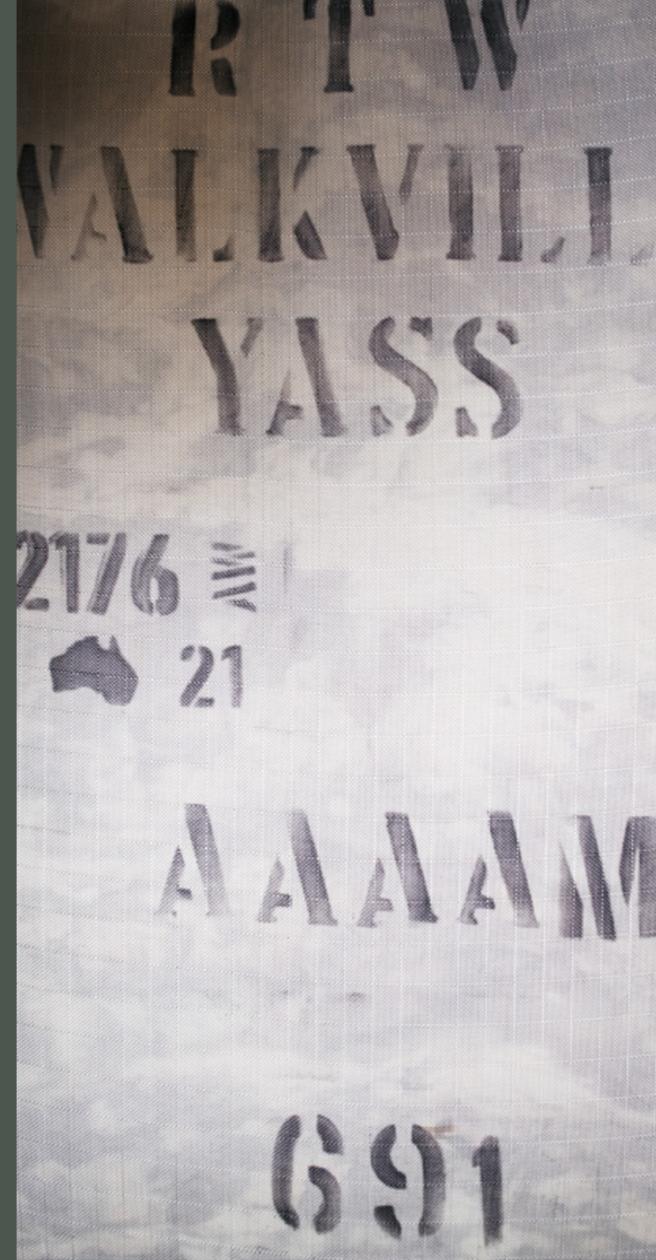
A typical wool bale will travel hundreds of kilometres from the farm to one of the three major wool-selling centres in Sydney, Melbourne, and Fremantle.



After sale, bales are packed into shipping containers for export to processing centres. Around one-third of them are exported 'dumped', where two or three bales are hydraulically compressed to the volume of a single bale, and bound with steel bands.



95% of greasy wool bales are exported to other countries for processing – mostly to China, which purchases 75% of the Australian wool clip.



Australia's wool traceability systems are considered effective and comprehensive and allow for the tracing of individual bales back to individual farms

Australia's developing traceability systems

Traceability is the ability to track a product through the various stages of a supply chain.

For wool apparel and interior textiles, traceability represents a complex but necessary challenge, involving the tracking of individual wool bales from many thousands of farms through wool selling centres, international freight, and a multi-stage manufacturing sequence involving an array of global partner countries.

Consumer market requirements have evolved, such that the provenance of the purchased product, and production standards, are increasingly important in the product marketing mix required by brands and retailers.

Biosecurity principles also mean Australia's traceability systems must be robust in order to ensure rapid and effective emergency response.

Australia's wool traceability systems are considered effective and comprehensive and allow for the tracing of individual bales back to individual farms. However, this is an area of active industry R&D as part of future-proofing this important export industry.

National Traceability Framework

The Australian National Traceability Framework (ANTF) is an Australian government initiative across all industries to enhance our traceability systems and respond to international drivers for change.

The ANTF was initiated after a 2018 review of traceability systems for all agricultural commodities, which found that while our current traceability systems meet our domestic needs and the needs of our trading partners, opportunities exist to enhance and future-proof these systems.

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Tracing wool bales

Given the great distances involved in Australian wool production, testing, and on-ship export, and Australia's strict biosecurity standards, ready traceability is a critical for the industry.

Ultimately, each bale of fresh wool is traceable to the farm of origin, through a combination of the industry Wool Classer Specification, individual bale numbering and bale labels, and property identification detail.

Identifying sheep and farms

Australia has a national mandatory system for uniquely identifying properties, tracing livestock movements over their lifetime, and submitting vendor declarations.

- Australia's National Livestock Identification System (NLIS), managed by ISC, provides processes for animal identification standards for sheep, cattle and goats, and individual property identification.
- All livestock are required to be identified with an NLIS accredited tag before being moved from one property to another.
- Each state in Australia is responsible for applying the NLIS national standards, and, as an example, the format for the Property Identification Code (PIC) differs state by state.
- Australia's National Wool Vendor Declaration (NWD) is managed by the Australian Wool Exchange (AWEX), and enables bales of wool to be traced to individual farms and the mobs of sheep within. The individual PIC is listed on the NWD.

Innovation: WoolClip and WoolQ

Traceability of wool bales starts in the shearing shed, and two new digital tools now available to Australian growers offer the potential to streamline information flow and reduce risk of errors.

- The WoolClip app and web tool creates wool and NWD information at the farm level and transmits it to the next stage in the supply chain. WoolClip captures electronically enabled bale labels to complete the independent traceability story by reducing errors and increasing efficiencies through the raw wool supply chain.
- WoolQ™ is a secure online platform where woolgrowers, classers, brokers and buyers can access digital tools to support all stages of the wool-growing and selling cycle. WoolQ™ includes a digital classers specification and network functionality for provenance and trading purposes.

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Clip preparation



IMAGE BY LEAN CLIPPER

Clip preparation is critical to the quality of wool entering the wool supply chain.

Australian clip preparation standards are the world's highest and have influenced other countries'.

Rigorous assurance protocols such as national clip standards, classer training, accreditation and appraisal, and strong industry oversight through the Australian Wool Exchange (AWEX) ensure the level of quality is maintained.

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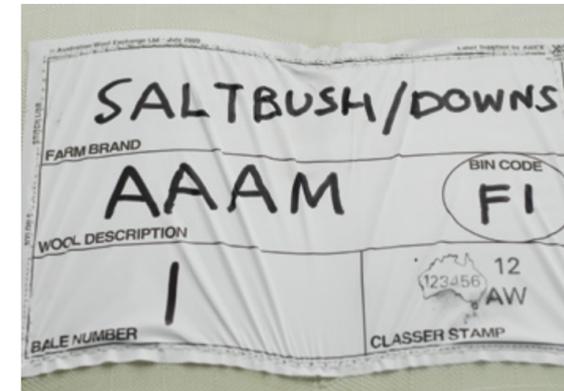


IMAGE BY LEAN TIMMS



IMAGE BY LEAN TIMMS

Wool packaging standards



All wool packs approved for importation into Australia must meet rigorous Australian standards and quality controls, and be safe to use without risk of contamination.

All importers of wool packs are registered with AWEX and can only import wool packs from AWEX-approved manufacturers that comply with the current version of the AWEX Wool Pack Standard.

This prescribes the use of low contaminant risk, recyclable nylon pack material.

World-leading clip preparation standards

Clip preparation involves the handling and subdivision of individual shorn fleeces in the shearing shed, and their allocation into lines of wool for sale.

Australian clip preparation standards aim to maximise the quality and predictability of each line of wool prepared for sale, while minimising purchase risks for wool buyers and processors.

Australian clip preparation standards are defined in the industry Code of Practice for the preparation of wool clips, and regulated through the AWEX as an integrated wool quality system.

This system encompasses the training and accreditation of wool classers, wool pack standards, standardised descriptions for classed wool, and continual performance auditing.

All wool offered at auction in Australia is audited by AWEX clip inspectors to detect lines of wool prepared below the minimum standard, and inspection results are reported to classers.

The national framework for clip preparation

The Australian Code of Practice (COP) for the preparation of wool clips defines recommended practices and standards to which Australian wool should be prepared. The COP is developed by AWEX in consultation with the industry, and ensures:

- The preparation of uniform, predictable, low-risk lines of wool suitable for the diverse needs of wool processing;
- Classed wool free from contamination, and correctly documented, described and packaged.

Since 1994, AWEX has maintained a register of qualified wool classers, who have demonstrated their competence in classing to the COP standard.

Each classer must be able to demonstrate and maintain competence, and their performance is continually monitored by AWEX.

Registered wool classers are individually provided with a stencil containing their unique identification number and are required to apply their stencil to each bale prepared by them, to the COP standard.

National Wool Declaration

The Australian National Wool Declaration (NWD) plays a critical role in ensuring Australia's clip meet evolving customer requirements. It is managed by AWEX.

The NWD is the standardised method by which woolgrowers define and declare their animal welfare practices (such as mulesing status) and the Dark and Medullated Fibre Risk of their wool to wool exporters, processors and retailers.

To ensure NWD integrity, AWEX has implemented a two-tier audit and integrity program including farm inspections, and provides a consignment verification service for wool exporters.

Innovation: e-Bale

For decades, our industry has been considering the application of electronic bale identification technologies where each pack has a unique, machine-readable ID.

With around 1.5 million individual wool bales filled each year on approximately 37,000 farms around Australia, and with rapidly evolving technology platforms, the challenges have been substantial. However, the many potential benefits to our industry from electronic identification of wool bales include:

- Improved bale traceability, and rapid independent identification and localisation of bales in the event of an emergency animal disease outbreak (e.g. foot and mouth disease);
- Improved information flow from farm to processor (which means more accurate identification and location of bales);
- Enhanced performance and data integrity of wool classer specifications and associated information.

Large scale trials are now underway on-farm and in-store, with new AWEX e-Bale labels containing a QR-code for in-woolshed use, and a radio frequency identification (RFID) tag for use along the logistics pipeline, both domestically and internationally.

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Fast Facts

There are more than 16,000 registered wool classers in Australia.



Each registered wool classer is accredited for three years.



Typical Australian wool bales weigh 178 kilograms.



Of the registered classers, 6,000 are owner classers – growers who prepare their own clip.



Around 1.5 million bales of wool are prepared in Australia each year.



Wool specification and marketing

Specification of wool qualities is critical to the operation of the global wool textile trade, and development of the wool market.

Australia has dominated wool specification and marketing investment for decades.

The nation's wool clip is highly specified and efficiently transacted through three major wool selling centres.



IMAGE BY KELLY TUNNEY FOR HERCANTERRA



IMAGE BY HEAVY TURNS

Proof of quality and performance

Due to the wide diversity of its technical properties, Australian wool is transformed into a wide array of textile products, from high-fashion apparel, to carpets and home furnishings.

Manufacturers of these products require highly specified wool, suited to their product's specific end-use. As a result of a 30-year industry innovation program which began in 1970, virtually all Australian wool is now offered for sale with a comprehensive suite of technical specifications, many of which were developed in Australia.

Australian wool is valued and sold with the aid of physical measurements for fibre diameter, clean wool yield, vegetable matter contaminants, staple length, strength and position of staple breakage, and sometimes colour.

Today, wool processors can confidently expect that wool purchased in Australia, having been tested and certified, will perform to requirements. And growers can be assured they'll get paid according to the measured properties of their wool.

Wool testing and certification

Australia has been an integral contributor to the development of the global system for trading greasy wool, based around International Wool Textile Organisation (IWTO) test certificates.

Nearly all Australian wool is bought and sold with an IWTO test certificate. Each bale of wool is independently weighed, sampled and tested, and the resulting certificate reports the total number of bales tested, the yield of each bale, the characteristics of the wool and its mulesing status. While there may be minor differences in reporting systems between countries, almost all are now aligned using the IWTO system.



Sampling and sale

In 1970, Australia embarked on the Australian Objective Measurement Program, to modernise the manual 'hands and eyes' wool valuation and sale methods applying at the time. Key developments over the subsequent decades have included:

- Core and grab sample technology to remove wool from bales for testing;
- Modern testing methods for fibre diameter, length, strength, yield, vegetable matter content, colour, and other parameters affecting the processing potential of wool;
- Australia's Dark and Medullated Fibre Risk Scheme, and later, the National Wool Declaration for mulesing status;
- International methods for monitoring agricultural chemical residue content for greasy wool, with Australia having monitored residue levels in Australian wool for more than 30 years.

Fast Facts

Around 1.5 million bales are sampled and tested before sale each year in Australia.



The typical Australian sale lot is sold at auction with 23 individual quality specifications.



The finest bale of Merino wool produced in Australia averaged 11.0 microns in diameter when tested in 2016 – finer than most cashmere.



Sustainability

Australia's wool industry invests heavily in sheep health and welfare, and sustainable land and social resource management.

The wool fibre itself contributes to the sustainability of the global fashion industry, being a renewable, biodegradable, flame-resistant fibre.

50% of the weight of clean wool is 'green' or biogenic carbon, unlike fossil oil-based fibres.

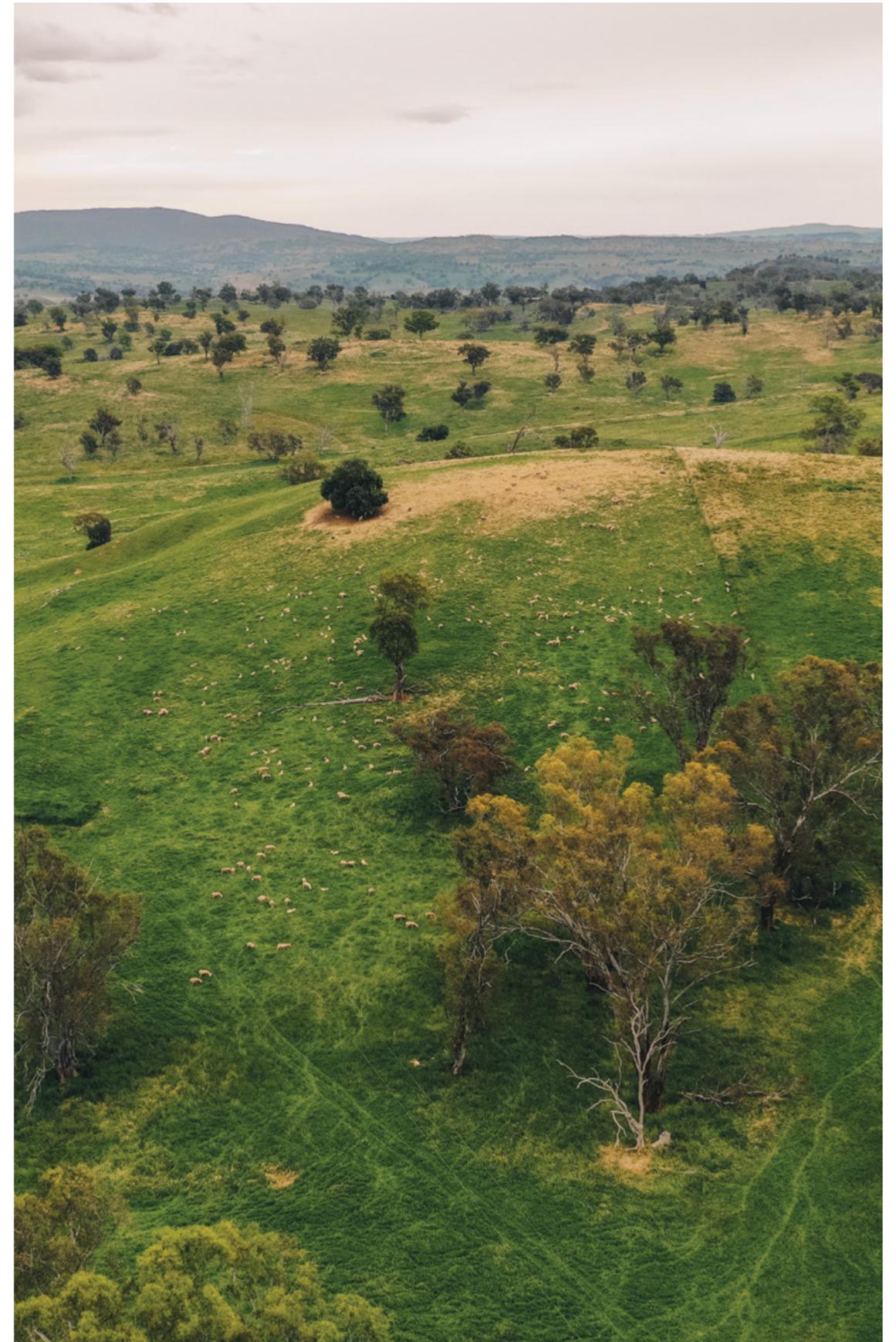


IMAGE BY CAM DAVIS AT RAMPRO

Innovation and progress

The Australian wool industry has a proud tradition of adaptation and innovation, which has helped it grow to be the world's largest exporter of wool from the world's driest inhabited continent.

Sustainability of Australian sheep and wool production is codified in strong national and state legislative instruments, and through individual state and territory Environmental Protection Agencies.

Sustainable practices are also supported by long-running industry and Commonwealth partnerships in the funding of research, development and extension – notably in areas such as pasture plant breeding, grazing management and rehabilitation of degraded areas, drought resilience, and practice change.

Australia also strongly supports the United Nations Sustainable Development Goals, and the wool industry makes contributions aligned with many of these goals.

Australian wool growers are also leading the development and adoption of wool production sustainability accreditation and certification schemes, such as AWEX's SustainaWOOL Integrity Scheme, the Authentico® program, and the Textile Exchange's Responsible Wool Standard.

Legislative framework for sustainable practice

Australia's state and national governments agree that it's vital to achieve sustainable land use. As is conserving and improving Australia's biota, as well as soil and water resources that contribute to the maintenance of essential ecological processes and the production of food, fibre and shelter. This legal framework is complemented by the National Sheep Industry Sustainability Framework, which outlines both an industry commitment to continuous improvement of sustainable practices, and the metrics for monitoring progress.

Commonwealth Legislation:

- Environment Protection and Biodiversity Conservation Act 1999
- National Strategy for Ecologically Sustainable Development 1992

State and Territory Legislation:

- NSW: Protection of the Environment Administration Act 1991
- SA: Environment Protection Act 1993
- VIC: Environment Protection Act 1970, and 2017
- WA: Environmental Protection Act 1986.
- TAS: Environmental Management and Pollution Control Act 1994
- QLD: Environment Protection Act 1994
- ACT: Environment Protection Act 1997
- NT: Environment Protection Authority Act 2019

Sustainability innovation

- Annual legumes are critical to sustained agricultural production from grassland, fixing atmospheric nitrogen into the soil and improving fertility. Major legume breeding programs have yielded many new pasture legumes including the world's first commercial bladder clover in 2007, and varieties resistant to pests such as Red-Legged Earth Mite.
- Perennial pastures were the focus of the successful EverGraze program, which designed, tested and implemented farming systems based on perennials, to increase profitability of livestock enterprises and also reduce ground water recharge and soil loss.
- Dryland legumes are the focus of the Dryland Legume Pasture Systems project, which combines recently discovered pasture legumes together with innovative management techniques that benefit animal and crop production and farm logistics over one million hectares in the low- to medium-rainfall areas of WA, SA, VIC and NSW.
- Keeping lambs alive was the focus of the Future Farm Industry CRC and EverGraze collaboration to show how strategically planted perennial grass hedgerows or shrubs can form shelter belts and improve lamb survival – especially for lambs born as twins or triplets. The commercial results indicate growers can achieve 10-15% higher lamb rearing rates.
- The Australian Pasture Genebank (APG) was established in 2014. The APG is partly funded by the Australian wool industry, and holds one of the world's most diverse and significant pasture and forage collections featuring more than 84,000 globally unique accessions of seed. More than 25,000 APG seeds have been deposited in the Svalbard Global Seed Vault in Norway.

SEE URL TABLE, PAGE 42



IMAGE BY LEAN TIMMS

Wool Sustainability Declarations

Australian wool producers voluntarily participate in international sustainability accreditation and certification programs.

- AWEX's SustainaWOOL Integrity Scheme is Australia's largest, with more than 1,000 accredited growers and supply chain partners. SustainaWOOL is certified under ISO 9001:2015, and recognises non- and ceased-mulesed wool, as well as wool from sheep mulesed with pain relief.
- G. Schneider's Authentico® scheme has more than 600 accredited fine wool growers around Australia, and only accepts non- or ceased-mulesed wool.
- The Textile Exchange's Responsible Wool Standard (RWS) is an international wool production and processing certification scheme adopted by some Australian growers. RWS accepts non-mulesed wool only.

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Meet a wool grower

Dave and Katherine Vandenberghe, along with two full-time staff members, farm 6072 hectares of coastal sandplain country near Esperance, in Western Australia. Typically, 3,000 hectares of wheat and barley are produced each year, along with 8,000 sheep – including the 1,600 ewes at the Wattle Dale Merino stud.

The Vandenberghes are well-known for the quality of their stock, and their progressive approach to evolving their farming systems using new technology and information – including sheep genomics and advanced pasture legumes. Dave is also vice-president of the local grower innovation network, one of many such networks around Australia.

Supporting sustainable global development

The United Nations' (UN) 17 Sustainable Development Goals were adopted by all member states in 2015.

These promote sustainable development and consumption, to end poverty and avoid natural resource degradation.

Australia has ratified this UN initiative, and actively supports achievement of these goals. Australian sheep and wool industries are part of this effort.



An agenda for the future of sustainability

Established in 1945, the UN is made up of 193-member states – these include the 81 wool-growing countries, including Australia.

Since 1992, the UN General Assembly has recognised that in order to address poverty and protect the planet from degradation, it is imperative to establish sustainable consumption and production. As a result, in 2015 the UN General Assembly adopted the 2030 Agenda for Sustainable Development, underpinned by 17 Sustainable Development Goals with 169 individual targets.

The 2030 Agenda is not just for and about government – it also engages the private sector, civil society, academia and international organisations.

The Australian wool industry actively contributes to international efforts in promoting sustainable industry developments, and has been a leader in wool production innovation for decades.

Australia is also an active contributor to the International Wool Textile Organisation (IWTO), the Brussels-based body that’s been representing the interests of the global industry since 1930.

International wool efforts

Since 1930, IWTO has worked to ensure the development of a sustainable global wool industry by facilitating international trade, research and development, and knowledge sharing. IWTO’s membership includes all major grower and processor countries, including Australia.

Australia’s many contributions occur primarily through a national committee and AWI.

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Australia’s contribution

Recognising Australia’s geographic location and economic attributes, the Australian government’s commitment is focused on the Indo-Pacific region. They are working through partnerships to foster innovation and private sector led growth; and are assisting less fortunate countries enhance productivity in agriculture, among others.

The Australian Department of Foreign Affairs and Trade is responsible for monitoring and reporting Australian’s contributions to the UN Agenda.

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The Australian wool industry’s key alignments with the UN Goals

The contribution of the Australian wool industry includes investments in innovation and technology development which benefit other countries. The align with many of the UN’s 17 Sustainable Development Goals:

Zero hunger

Industry and government invests in sheep health, welfare, sustainable production, vertebrate pest control, climate change adaptation (UN Goal 2.4) and the Australian National Pasture Seedbank (UN Goal 2.5).

Good health and well-being

Industry and government invests in reducing chemical impacts during wool processing, and developing wellness-related wool applications such as for atopic dermatitis, and improved sleep (UN Goal 3.9).

Industry, innovation and infrastructure

Industry and government invests in wool R&D and extension in Australia, but also in countries such as China, Vietnam and India (UN Goal 9.5).

Sustainable cities and communities

Australian and IWTO efforts aim to evidence and communicate wool’s recycling and re-use, and contribute to the EU and other product environmental footprint research (UN Goal 11.6).

Responsible consumption and production

Australian and IWTO efforts – including the international Campaign for Wool – aim to educate processors, designers and consumers of the environmental and health benefits of wool (UN Goals 12.4, 12.5, and 12.9).

Life on land

Industry and government invests in on-farm R&D into grazing management, drought resilience, pasture innovation and reduced lamb mortality (UN Goal 15.3).

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Excellence framework

Australia is the leading global supplier of wool, and the world’s largest wool exporter nation. The nation’s pre-eminence in wool production standards and volumes reflects both our unique geography and climate, and our culture of innovation and excellence.

Key to that culture is the long-standing funding partnership between Australian governments and woolgrowers, working together with responsible wool industry organisations to ensure sustainable industry development, technical progress, and knowledge sharing.

This industry-good partnership is based around the Commonwealth Government:

- Collecting levies from the wool and sheep meat transactions of sheep producers;
- Adding taxpayer funds to match grower contributions;
- Directing investment of these combined levy and matching funds to research and development activities through the wool and sheep meat research and development corporations – AWI, and MLA.

Together with industry bodies responsible for domestic and international representation, wool testing and standards, these partnerships comprise Australia’s framework for industry growth, sustainability, and continuous improvement.

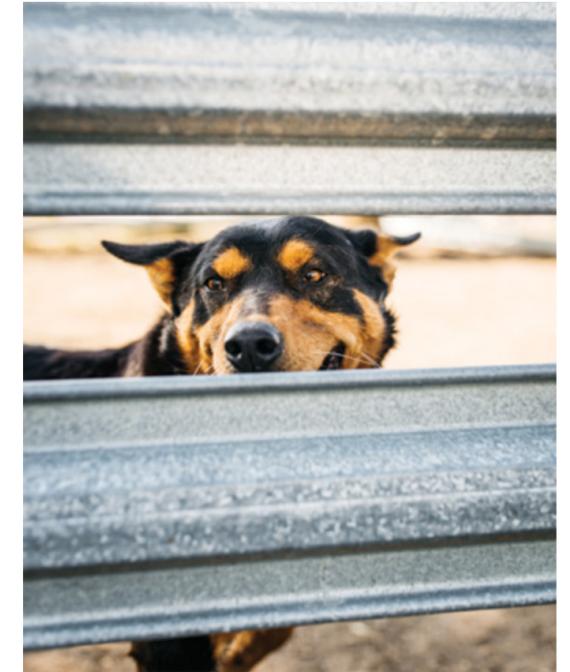


IMAGE BY LEAN TIMMS

Australian Government	Key industry bodies	Outcome areas
Department of Foreign Affairs and Trade (DFAT)	Representation WoolProducers Australia (WPA)	Australian wool trade
Department of Agriculture, Water and the Environment (DAWE)	Health, Welfare and Biosecurity Animal Health Australia (AHA) Plant Health Australia (PHA)	Sheep health Sheep welfare
State and Territory Governments	Wool Testing and Standards Australian Wool Testing Authority (AWTA) Australian Wool Exchange Limited (AWEX)	Wool biosecurity Wool traceability Clip preparation
Wool Growers	Levy-funded Research, Development and Marketing Australian Wool Innovation (AWI) Meat and Livestock Australia (MLA)	Wool marketing and specification Sustainability Supporting sustainable global development

Key organisations and resources

The following table summarises the key organisations and their major contributions to the Australian wool industry.

Area	Key organisations	Accountabilities and resources
Commonwealth Government	Department of Agriculture, Water and the Environment AWE.GOV.AU	Wool Research and Development Biosecurity Regulation of wool exports Negotiating technical market access
	Department of Foreign Affairs and Trade DFAT.GOV.AU	International Trade United Nations Sustainable Development Goals
Government-Industry partnership	Animal Health Australia ANIMALHEALTHAUSTRALIA.COM.AU	Australian Animal Welfare Standards and Guidelines Biosecurity and disease surveillance Emergency Animal Disease Response Agreement Emergency response (AUSVETPLAN) Sheep health and welfare Sheep Health Declaration
	Plant Health Australia PLANTHEALTHAUSTRALIA.COM.AU	Plant Health and Biosecurity (PLANTPLAN)
Industry representation	WoolProducers Australia WOOLPRODUCERS.COM.AU	National industry representative body Emergency Animal Disease Response
Innovation and industry development	Australian Wool Innovation WOOL.COM	Wool research, development and marketing The Woolmark Company Wool-Q
	Meat and Livestock Australia MLA.COM.AU	Sheep meat research development and marketing National Livestock Identification System Livestock Production Assurance Livestock Data Link SheepGenetics
Wool trading and preparation	Australian Wool Testing Authority AWTA.COM.AU	Wool testing and certification Wool research and development
	Australian Wool Exchange Limited AWEX.COM.AU	Auction conduct and standards Code of Practice for Preparation of Wool Clips National Wool Declaration Integrity Program SustainaWOOL Wool classer training and registration Wool pack standards WoolClip



A COLLABORATION
BETWEEN

Animal Health
Australia *and*
WoolProducers
Australia